PERPETUAL MOTION
The Story of Bessler's Wheel

In the early 18th century, the German inventor Orffyreus successfully demonstrated a so-called perpetual motion machine that utilised the force of gravity to do work.

by John Collins © 1997

From his book
PERPETUAL MOTION: An Ancient Mystery Solved?

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A perpetual motion machine is a device which, once having been started, continues to run for ever, without <u>any</u> additional input of energy.

The theory of perpetual motion has been consigned to the dustbin of discarded myths—ahead of such pseudo-scientific suppositions as UFOs, crop circles, holistic medicine and all the paraphernalia of the paranormal. The mighty weight of established scientific opinion is against such beliefs because they cannot be explained within current scientific dogma.

The dictionary definition of 'dogma' is 'settled opinion, indisputable doctrine'. Rigid adherence to current theories becomes unstuck only when the overwhelming evidence that the known facts cannot possibly sustain establishment beliefs, forces scientists to back down and look for alternative explanations.

Should the scientific establishment be accepting any of the *alternative* theories as areas of potential research? Not necessarily; but someone, somewhere, should be listening to such ideas; and if and when conflicting evidence arises, it should be discussed in an open and sensibly critical way rather than dismissed as so much hot air.

So many examples exist of accomplished scientific researchers who have been led into areas regarded as 'taboo' by orthodox scientific opinion, that the term 'scientific heresy' has been coined to describe their deviant theories. A 'heretic' is an exponent of unorthodox opinion, and 'orthodox' means 'conforming to commonly accepted opinion'.

There are many modern candidates for the application of the term 'scientific heretic' and it has become a popular subject for discussion in the media. Some competent scientists, specialists in their own fields, became aware of conflicting evidence that certain theories relating to subjects such as homoeopathy and telepathy might, after all, have some basis in truth. This evidence became so overwhelming that these same scientists published their results in the mistaken belief that such information would be welcomed by their peers. In fact, the reaction was the opposite of what they'd hoped for: some were demoted and others had their research grants removed.

By now you may suspect that I place myself among the modern heretics, and in a way you'd be right. I have discussed the subject of this book with numerous people, both professional and lay, and it is with the former that I have received a scornful dismissal of the theories advanced in it, and yet it is the very simplicity of my findings that begs for attention. I intend to show that *under certain circumstance*s, perpetual motion *of a kind* is certainly a possibility—and a machine to utilise it is an absolute necessity in the face of the falling levels of fossil fuels and the rising levels of pollution that beset our planet Earth.

From an early age we are taught that perpetual motion is impossible according to the laws of conservation of energy and of thermodynamics. We are told that we cannot get more out of a thing than we have put in—a logical statement and perfectly true! I shall show you how, although this is true, it is not actually relevant to the problem. These laws and this saying have been ingrained in us, hammered into us, and we have laughed at accounts of early experiments to find the answer to perpetual motion. We find it impossible to believe that there could be a way around the problem. It is the problem of the 'closed mind'.

These days, most revolutionary discoveries are thought to have come from the ranks of educated scientists—but not so. Many ideas and contrivances have been made by men who never attended university, who were gifted amateurs or became obsessed with finding a solution to a problem that was of particular relevance to them personally. Among

these gifted amateurs was no less a person than Michael Faraday, sometimes called 'the father of electricity', yet he was self-taught. The obsessed 'suffer' from an undue preoccupation with an idea, and such ideas can arise out of need. There was surely never a truer saying than 'necessity is the mother of invention'; and in deference to those whose work could not be accepted until it was proved beyond a shadow of a doubt, as Mark Twain once said, 'A crank is only a crank until he's been proved correct'.

So what do I really mean by 'perpetual motion'? It is known by both the layperson and the scientific community that such a device would violate one or more scientific laws. There are continuing experiments in superconductivity, in which metals or ceramics are cooled to such a low temperature that they lose all resistance to the passage of a direct electric current, allowing the current to continue to flow, undiminished, in a superconducting ring. This is usually referred to as 'perpetual motion of the third kind'. It is not required to do work, but to run continuously, yet it takes enormous amounts of energy to keep the conducting material at a very low temperature. Work continues apace to find a ceramic which will operate in the same way at room temperature, and this may well soon happen but the device will still be unable to *do work*. The kind of perpetual motion which we shall be looking at is known as 'the first kind', and it *is* expected to *do work*.

Perpetual motion research can be traced back thousands of years. Behind it lies a dream of free energy which could be tapped by mankind for uses such as pumping water or turning mills. Exactly how far back the search can be traced is restricted by the fact that we must rely on written records. A fifth-century Sanskrit manuscript on astronomy, *Siddhanta Ciromani*, describes an attempt at a perpetual motion machine, but this is unlikely to have been an isolated example, even at this early period. If *one* person saw a need for such a device at that particular time, then others would have done so, but they might not have gone into print. I suspect that if written records were available, they would show that the search for perpetual motion began a long time before the fifth century. Indeed, there is a certain amount of evidence that pushes the date back some 7,000 years.

Johann Ernst Elias Bessler, also known as Orffyreus.

Our modern educational system has ruled out any chance of such energy generation; but in the 18th century, things were not so definite. Heated discussions continued as to the possibility of perpetual motion. Some believed it might be feasible under certain circumstances. Others, the majority of the scientific establishment, declared such an idea outrageous, ridiculous or impossible. It was known that the ultimate problem was one of friction, and work would only increase the effect that friction was already having. Heat was a consequence of friction, and the heat was readily dissipated to the surrounding cooler air, just as the law of thermodynamics suggested. There would never be enough energy held, within a machine, to draw on for more than a few hours at best, and it would not actually be able to do any work.

There are only two laws of thermodynamics, and the first one says that a certain amount of mechanical work will produce an equivalent amount of heat. In other words, energy can be converted into heat, but it can't be destroyed or created. The second law says that heat cannot be increased without the expenditure of more work, or energy. This means that heat can only flow out to cooler surroundings; it can't do the reverse. Today these statements seem very obvious and, when combined with the laws of motion as defined by Sir Isaac Newton, appear to rule out the possibility of perpetual motion.

The first law of motion states the rather obvious fact that a body or thing which is at rest, i.e., not moving, will continue to remain at rest unless acted upon by an external force, i.e., if something pushes it. It goes on to mention that if the body is moving in a particular direction, it will continue to move in that direction unless acted upon by some external force, i.e., if something causes it to change direction. The second law elaborates on the first law in that it states that the action of something pushing or striking a body in motion is the same in magnitude and direction as if it acted on the body at rest. The third and final law says that every action has an equal and opposite reaction—and anyone who has ever attempted to ice-skate will vouch for the truth of this.

So these are the laws which, in part, help to exclude the possibility of perpetual motion, and they cannot be faulted. Actually, they are statements of fact that grew out of the writings of the ancients such as Thales, followed by Copernicus, Kepler, Galileo and Descartes. Newton combined the work of his predecessors and then added his own unique brand of genius, producing his *Principia Mathematica*.

Remarkably, it seems that Newton himself did not rule out the possibility of a perpetual motion machine. It is a little-known fact that in his early notebooks, under the heading "Quaestiones" (*sic*), Newton speculated that gravity (heaviness) is caused by the descent of a subtle matter which strikes all bodies and carries them down: "Whither ye rays of gravity may bee stopped by reflecting or refracting ye, if so a perpetual motion may bee made one of these two ways." Adjacent to these words, Newton added two sketches of perpetual motion powered by the "flux of the gravitational stream". Moreover, Newton became directly involved in a famous controversy regarding a perpetual motion machine, but, although challenged to comment on it, he maintained a dignified silence.

I mentioned that 'perpetual motionists' were busy in the 18th century. However, earlier than that, in 1623, the King of England passed an Act which eventually led to the establishment of the British Patent Office. Inventors were allowed to retain the rights to their own invention and to secure a monopoly on their idea for a certain length of time; thus they were given a chance to develop their invention and exploit it without competition. In 1635, a patent was granted for a perpetual motion machine, but we know nothing about it, as no description exists. In 1903, some 268 years later, nine applications for perpetual-motion-related devices were received by the patent office. In those intervening years the patent office dealt with over 600 applications that claimed designs for a perpetual motion machine!

It did not end then, but perhaps due to the improvement in education of more people and the widely held belief in the impossibility of perpetual motion, potential claimants to the secret have discovered that discretion is the best policy against a scornful public. Little is heard of the secret experiments in sheds and garages by amateur inventors still trying to solve the ancient puzzle. However, a glance through the back issues of such well-known publications as *Life*, *Newsweek*, *Smithsonian*, *Esquire* and *Science Digest* will reveal articles on several modern inventors who believe it is just a matter of time before they solve the conundrum with a working model demonstrating perpetual motion.

Suppose one man did claim to have discovered the secret. What if he did make a working model? What if he exhibited it to the public? What if he submitted it for testing by the top scientists of the day? What if it passed every single test that could be devised? And what if he offered it for sale for £20,000, but was unable to find a buyer who would adhere to his strict but fair conditions? What if one man did all that, and eventually died in poverty thirty-three years later, still exhibiting his machine, still hoping that someone would believe him, and still with his secret unrevealed, unsold and unsolved? Can this be possible? Could someone have succeeded where all before had failed?

Astonishingly, history does record just such a man. His full name was Johann Ernst Elias Bessler (1680?–1745), but he was better known by his coded pseudonym, 'Orffyreus'.

Nearly 300 years ago in a small town in Germany, a most remarkable thing happened. Johann Bessler, or Orffyreus as he liked to be called, had perfected his new invention, and he let the local people into his house to see it in the hope of his selling the secret to some wealthy patron for a large sum of money. The precise date was 6 June 1712 and the town was Gera.

Reaction to Orffyreus' invention surpassed his expectations. Word spread and a crowd gathered around the device (which took the form of a narrow drum mounted on a pair of supports). Things got to the stage where the inventor had to close the exhibition. Later, Orffyreus had the machine cordoned off in an attempt to control the viewing of his prototype perpetual motion machine, but even this was insufficient. He had no desire to prevent the townsfolk seeing his wonderful wheel, but he was not prepared to risk the secret of its construction becoming known. So, following his brother Gottfried's advice, he began to ask a small charge for admission, giving all proceeds to the poor, and this did help to reduce the crowds to more manageable numbers.

The machine was not large; it was three feet (just under a metre) in diameter and four inches (about 10 centimetres) in depth. It was held stationary by a cord attached to the rim. As soon as the cord was released, the wheel began to revolve, slowly at first but gathering speed rapidly until it was revolving at a speed of 50 revolutions a minute. It had to be forcibly stopped, but, according to the inventor, if allowed to it would spin at this speed until the parts wore out. He promised that a larger machine could be constructed which would be much more powerful.

Over the next four years, Orffyreus responded to ever more restrictive demands and more severe requirements that his machines perform this test or that test, by producing improved wheel after improved wheel.

News of Orffyreus' wheel spread to the farthest corners of the Western world. In England it met an impressive wall of disbelief, among the scientific community at least. Reports reached the ear of Peter the Great, Czar of all Russia, who went to considerable lengths to buy the secret. Perpetual motion was discussed by scientists, philosophers, statesmen, envoys and their rulers. Heated disputes arose over whether perpetual motion was possible and whether Orffyreus had to be a fraud and a charlatan to make such claims. Anyway, how could a mere market trader have discovered something that had eluded the finest intellects the world had ever known? But Orffyreus was far from a mere market trader.

The general populace was curious about Orffyreus' invention, but the same could not be said for the intellectuals. Letters virtually spitting venom were fired off from one scientist to another in an attempt to prove that Orffyreus was a liar. Others refused to discuss the matter; their open, enquiring minds snapped shut.

The most vociferous and therefore the most widely listened to, was a small group of men from the town of Dresden, led by the Master Model-maker to the King of Poland. This man, Andreas Gärtner, published—or had published by his followers—the most slanderous tracts and pamphlets mocking Orffyreus or challenging him to come clean and admit that his machine was a fake. There was no recourse to the law, such as a claim for libel, so there was little Orffyreus could do other than go into print to defend himself. This he did with great enthusiasm, pouring out on paper all his hurt and injured pride.

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After the success of his first wheel, the small one at Gera, Orffyreus constructed a larger version which measured five feet (1.5 metres) in diameter and turned as the others had done, without stopping. Wonderful as this machine was, it still attracted criticism: "It is still too small"; or "A larger one would be more

useful"; or "A larger one would not work because, as everyone knows, the larger a machine is, the less efficient it becomes".

These were the kind of comments made about the wheel. The most telling one, in the opinion of the inventor, was the published statement by his enemy Gärtner—that the machine was wound up, and the winding was the source of its motive power. Orffyreus went away to ponder and came back with an irrefutable argument. He made a wheel that could turn in either direction, thus obviating the possibility of a clockwork mechanism.

This did not silence his enemies. Gärtner was joined by Christian Wagner, a student of mathematics, whose published tracts were, if anything, even more vitriolic than Gärtner's. Wagner tried to claim that Orffyreus had fitted some kind of split axle to his wheel in order to allow it to change direction. He did not explain how this might have been achieved, and he became something of a target for Orffyreus' sarcasm.

The new machine was submitted for examination and passed all the tests. As usual, these results were insufficient to satisfy those who believed that the inventor was a fraud, and Orffyreus left town yet again—after smashing his wheel to pieces in disgust.

News continued to spread of the inventor's work and the remarkable claims made for it. The Landgrave of Hesse-Kassel granted patronage to Orffyreus, made him a Commercial Councillor and invited him to rebuild his wheel, bigger and better than ever before. This Orffyreus did.

In 1716 he produced his biggest and most amazing device ever. This largest construction was in the form of a wheel or drum, 12 feet in diameter (slightly under 4 m), about 18 inches in depth (about 46 cm) and weighing around 700 pounds (317 kilograms). It was started with a gentle push, using two fingers, and quickly reached a speed of 26 revolutions a minute, at which it could raise a load of bricks weighing 70 pounds (nearly 32 kg) or turn an Archimedean screw for pumping water. Even more remarkably it could be stopped with tremendous difficulty and made to turn in the opposite direction where it would perform as before.

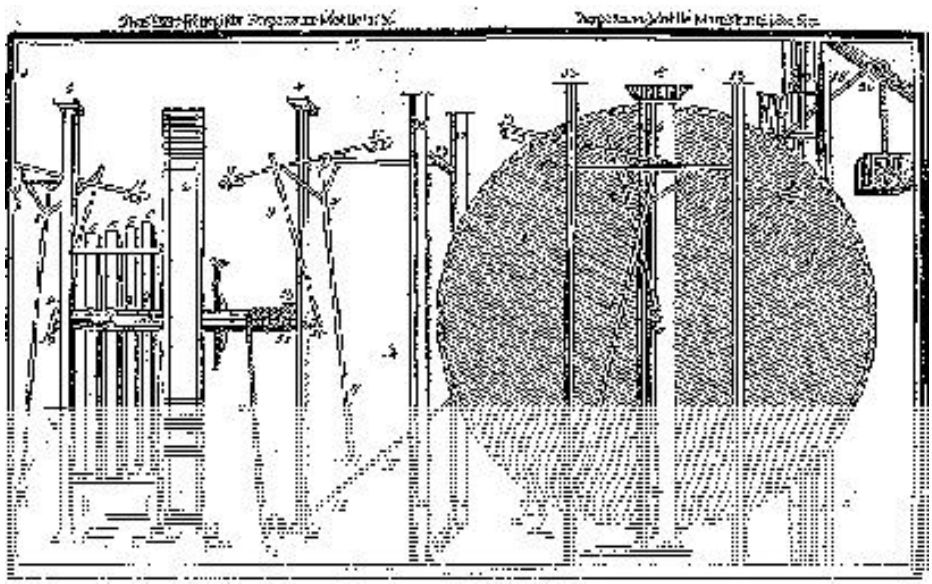
The machine successfully underwent an extended test—under lock and key and armed guard—for a period of 54 days (nearly eight weeks) without stopping. To this evidence one should add the numerous smaller tests and the most thorough examinations of everything visible on the wheel—except for the internal workings which, it was admitted, the inventor had a right to keep secret (until the desired purchase price had been agreed and paid).

But in spite of the successful tests, his enemies would not leave him alone. To Orffyreus' dismay, the detractors eventually won the day. In fact, from the moment he first demonstrated his invention, a storm of controversy had swiftly established itself and raged about him. When he died thirty-three years later, alone, in poverty, and still claiming that the invention was genuine and his own, and that he'd never been proved a liar, that storm, that hurricane of controversy, had not abated in the slightest.

The legend of Orffyreus' wheel is fairly well known, but by omission and distortion of the facts, the real story has never been told. Most of the information which appears in every encyclopaedia, in whatever language, tends to originate from one particular source.

In 1795, fifty years after Orffyreus' death, Friedrich Wilhelm Strieder published a biographical dictionary which includes an account of the inventor's life. In it, Strieder mentions that he used Orffyreus' own published writings as a source of information, complaining at the same time that he needed "great patience, I must say, since it is a truly abominable piece of prose". In fact, the account is written with some style and considerable wit and humour, but is overly long and repetitive when complaining about his enemies. I can understand that one might need patience to read all of it—Orffyreus' writing does suffer from an excess of verbiage—but it is not "abominable".

The veracity of Strieder's account of Orffyreus' life can be checked, fortunately. There are many Orffyrean tracts extant in which he describes his life, so the two versions can be checked for discrepancies. It is fairly obvious that Strieder had a very poor opinion of the inventor, and he does not hesitate to let us know on several occasions, but I have not been able to find any glaring difference of a factual nature between the two accounts. There is, however, a tendency to be selective in the use of certain facts. Strieder lays greater emphasis on some facets of the story, whilst playing down other aspects.



From Johann Bessler's first publication, *Grundlicher Bericht*, published in 1715.
(Source: From *Perpetual Motion: An Ancient Mystery Solved?*, © 1997 by John Collins)

Another source for accounts of the actual devices exhibited by Orffyreus are the newspapers of the day, and they provide much information about both the dimensions of the 'wheels', as they were called, and the prevailing opinion regarding the possibility of perpetual motion.

However, the best mine of information lies in the numerous letters written about the Orffyrean machine. Two of the most striking and convincing letters came to my attention through the efforts of William Kendrick (1725?–1779), a rather pathetic character who made a living penning literary articles. Kendrick actually died while waiting for the patent office to grant him a patent on his own design of a perpetual motion device. Whether it existed outside his own imagination is difficult to say, but certainly he was a believer in the possibility, and, indeed, gave a course of lectures on the subject.

But to return to Strieder, his account continues, albeit sketchily, from the time of the big Kassel wheel, up to the inventor's death. Unfortunately, we only have Orffyreus' own account of his life up to and including the building of the last wheel. It is therefore harder to determine how much faith to place in Strieder's account of Orffyreus' life after 1719 because we have nothing to compare it with, except what we can piece together from the numerous letters and newspaper reports. It is reasonable to assume that Strieder's account was a factual rendition of events, but biased. The reason for this bias is not hard to find.

In his search for information, Strieder turned up some extremely damning pieces of evidence—namely, no fewer than seven sworn statements to the effect that the inventor was a swindler and that they, the witnesses, had been forced to take part in the fraud and had been sworn to silence by Orffyreus. Most of the witnesses were either relatives of Orffyreus or his servants.

This evidence has been the overwhelming factor in the demise of Orffyreus' reputation, notwithstanding the fact that perpetual motion even at that time was regarded as a scientific impossibility. Faced with these facts, the reader may well feel it is pointless even to suggest that there could be anything other than fraud connected with the Orffyrean machine. All is not as it seems, however.

The biographer only reproduced two documents as examples, and as if these weren't bad enough he summarised accusations from some of the other documents. For instance, he stated that Orffyreus' "wife confirmed in great shame that she was forced to swear five oaths to her husband—who always carried consecrated wafers, but was a desperate man who cared for nothing—and that, in the end, she nevertheless felt obliged to confide secretly in a man who was bound by oath and duty, but that that man decided to take her treacherous husband's side and do nothing, even warning her of the most frightful consequences of any further action".

Can there possibly be any doubt of Orffyreus' guilt? History does not think so, and I wouldn't have had any doubt except for my finding one small, seemingly insignificant phrase which cast doubt on the authenticity of the evidence.

In a document dated 28 November 1727, Orffyreus' maid gave the following statement, as recorded by Strieder:

"The posts had been hollowed out and contained a long thin piece of iron with a barb at the bottom which was attached to the shaft journal. Turning was carried out from Orffyreus' bedroom which was close to the machine, on a shelf behind the bed."

The first area of concern was the maid's statement regarding the secret mechanism. It was, frankly, impossible. Whatever mechanism moved that wheel, there is absolutely no way that it could have been driven by the means described. Twelve feet (3.6 metres) across, 18 inches (45.7 cm) thick, and weighing an estimated 700 pounds (318 kilograms), and the whole construction turned on a pair of bearings measuring just three-quarters of an inch! And what is more, it accelerated from a very slow speed to one of between 25 and 26 revolutions per minute in just three revolutions!

...it had to be kept turning for almost eight weeks— and was expected to do work, i.e., raise a box of bricks weighing 70 pounds and turn an Archimedean screw.

The maid stated that the posts were hollowed out and a barbed piece of iron inserted and connected to the shaft journal. Anyone giving reasonable consideration to this account will see that the power and strength required to keep a machine of this size turning, by applying its force *through the bearings*, would be enormous. And besides, where would one find a metal of sufficient strength to withstand the tremendous load placed on it? Not only that, it had to be kept turning for *almost eight weeks—and* was expected to do work, i.e., raise a box of bricks weighing 70 pounds and turn an Archimedean screw. Forget the problem of actually devising a mechanism which would operate inside a wooden post connected to a bearing at one end and a small wheel at the other!

It is hard for me to convey the utter certainty in my mind, of malicious intent by the maid. I am sure that whatever criminal accusations may be laid at Orffyreus' door, the maid's account is fictitious.

And if this part of Strieder's evidence, the key part, is faulty, how much reliability may be placed on the rest of his evidence?

During Orffyreus' efforts to achieve recognition for his perpetual motion machine, his claims came to the attention of Karl, the Landgrave of Hesse-Kassel. He was similar perhaps to a Duke in England, and as such he ruled a small Dukedom, whose capital was the town of Kassel. It is recorded that he was the only man whom Orffyreus ever allowed to see inside the wheel. He was sworn to secrecy, and he never broke his word.

It puzzled me to think that if he had seen the inside of the wheel, he obviously knew the truth, and yet no mention was made in Strieder's biography of any comment by Karl following Orffyreus' arrest for fraud. He took Orffyreus and his machine under his patronage, and even made the inventor Councillor of Commerce for Hesse-Kassel. Could he have been a party to the subterfuge'? Or might he have been duped by a plausible rogue? Or, the only other possibility, was Orffyreus telling the truth? Had he *really* invented some kind of self-propelled machine? ∞

About the Author:
John Collins has worked within the engineering industry for most of his life, and has been intrigued and mystified by Johann Bessler's life and work for much of the last 30 years. He is experimenting with his own prototype based on Orffyreus' wheel and is having encouraging results. Collins is the author of *Perpetual Motion: An Ancient Mystery Solved?* (reviewed in NEXUS 5/03, April-May 1998). He can be contacted at PO Box 2001, Leamington Spa, Warwickshire CV32 6YQ, UK; tel/fax +44 (0)1926 424264; website <http://www.free-energy.co.uk>.

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